A novel heterogalactan from *Antrodia camphorata* and antiangiogenic activity of its sulfated derivative

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Abstract: *Antrodia camphorata*, a rare and expensive mushroom native to Taiwan has been considered to own diverse medicinal benefits. To obtain the homogeneous polysaccharide ACW0 and evaluate its biological functions, the lyophilized powders of *A. camphorata* mycelium were extracted with hot water and purified by anion exchange and gel permeation chromatography. The single symmetrical peak appeared on HPGPC indicated the homogeneous polysaccharide we have got and its molecular weight was also estimated to be 14.5kDa. Based on monosaccharide composition by GC, ACW0 predominantly contained galactose (94.98%), traces of mannose (2.41%), and fucose (2.61%). The polysaccharide was shown to be a mannofucogalactan with a backbone chain of α-D-1,6-linked Gal, nonreducing terminal α-D-Man and α-L-Fuc substituted at O-2 for nearly every six α-D-1,6-linked Gal. The bioactivity study indicated that the native polysaccharide ACW0 had no inhibition on *in vitro* matrigel tube formation, thereby ACW0 was sulfated, designated as ACW0-Sul, to change its chemical structure. The degree of sulfation was calculated to be 2.43, suggesting that almost every sugar residue was fully sulfated and sulfation position was also determined by the obvious change of chemical shifts in the ^{13}C NMR spectrum. We find that C-2, C-3 and C-4 of 1,6-linked Gal, C-3 and C-4 of 1,2,6-linked Gal were sulfated. However, the peaks of terminal Man and Fuc disappeared, which possibly indicated the degradation of them during sulfation. Most importantly, the sulfate derivative ACW0-Sul could disrupt tube formation and inhibit the migration of human microvascular endothelial cells (HMEC-1) dose-dependently. Besides, phosphorylation of ErK and FAK were also significantly inhibited by ACW0-Sul. These results suggested that introduction of sulfate group could enhance the bioactivity of polysaccharide from *A. Camphorata* and its sulfate derivative could be a potent antiangiogenic inhibitor for anti-cancer therapy.

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